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- THE THREAT, THE FORCE

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MAINTAINING PEACE:
The Threat, the Force, and the Nation

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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The nation is entering a challenging period in which a number of threats to peace, both foreign and domestic, must be addressed. The response that America makes to each of these issues will serve to either maintain or de-stabilize the balance of peace. This study will identify threats to peace in this country, cite recommended responses to address successfully those threats, and present a conceptual model for the study of peace maintenance as a discipline. Additionally, this mathematical model will allow for input quantification and suggest existing computer analysis tools for study of the model's use in a decision support system.

INTRODUCTION

There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.

Niccolo Machiavelli
The Prince, Chapter VI

The task before us could not be more difficult. Recent changes in Western Europe, the re-unification of Germany, and the demise of the Soviet Union have marked the end of a dramatic period in world history -- one that has left the United States as the single world superpower. The emergence of democratic republics throughout the world and the transition of those societies from a command economy to a market economy have produced specific challenges that often manifest themselves as threats to the stability of this nation. Our job is to restructure our national defense strategy, re-program our fiscal expenditures, and clearly define our actions as a nation to best provide a safe and comfortable future for Americans.

Historically, friction between nations has been viewed as a constant. Freud states that "...war is not to be abolished; so long as the conditions of existence between nations are so varied, and the repulsions between peoples so intense, there will be, there

must be, wars."¹ But perhaps Alexander Hamilton best articulated the feelings of most men when he said if we "...judge from the history of mankind, we shall be compelled to conclude that the fiery and destructive passions of war reign in the human breast ..."² Reign as they might, this author maintains that properly managed, the central theme enunciated variously by Hobbes and Locke, Rousseau and the Federalists remains valid today, namely: *"As anarchy leads to war, government establishes peace, and just laws preserve it."*³

Only recently has the inevitability of war been seriously questioned and the possibility of a lasting peace proposed.⁴ Unlike philosophers who have pontificated about world governments and dreamed of utopian societies, Kant writes realistically of a "moral commandment" to strive for a permanent peace: "We are the first generation to argue for world peace ... and to conclude that it is possible because it is necessary."⁵

Despite popular rhetoric to the contrary, the United States currently faces specific and dangerous threats which must be recognized and dealt with if we are to continue to enjoy our way of life. This study will present an original mathematical model for conceptualization of the maintenance of peace, specifically define the threat to this nation in detail, and make specific recommendations on national and global issues to secure our future and ensure our survival as a nation.

Peace as a Model

The product of any defense force is not readiness, preparedness, or any other term describing capability; ultimately, no one cares how prepared a force is if it cannot win in battle. Readiness for combat, in all its forms, is a secondary by-product of the defense effort. The real product of defense is, and must remain, the production of peace without subjugation. Perhaps it is helpful to think of the road to peace as one which is constantly under construction; a dynamic process that has as its only constant change itself. Given that the peace process is complex, a conceptual model has value in providing a means to examine its components. Because peace can exist when tensions are high as well as when they are low, such a model must allow for component quantification. At that point, peace mathematically becomes an expression describing a state of equilibrium between two opposing forces. Constructing a separate model for any given nation and dubbing the two sides of the equation as *threat* (T) and *response* (R), it is apparent that the most stable peace exists when the two are equal. Unbalancing the equation by increasing the *threat* creates a situation of heightened apprehension of war. Conversely, increasing the *response* unbalances the equation, but results in increased, often escalating, domestic social unrest; the net result is that both conditions de-stabilize societies and serve to reduce peace. The model is diagrammed in Figure 1, with all variables identified:

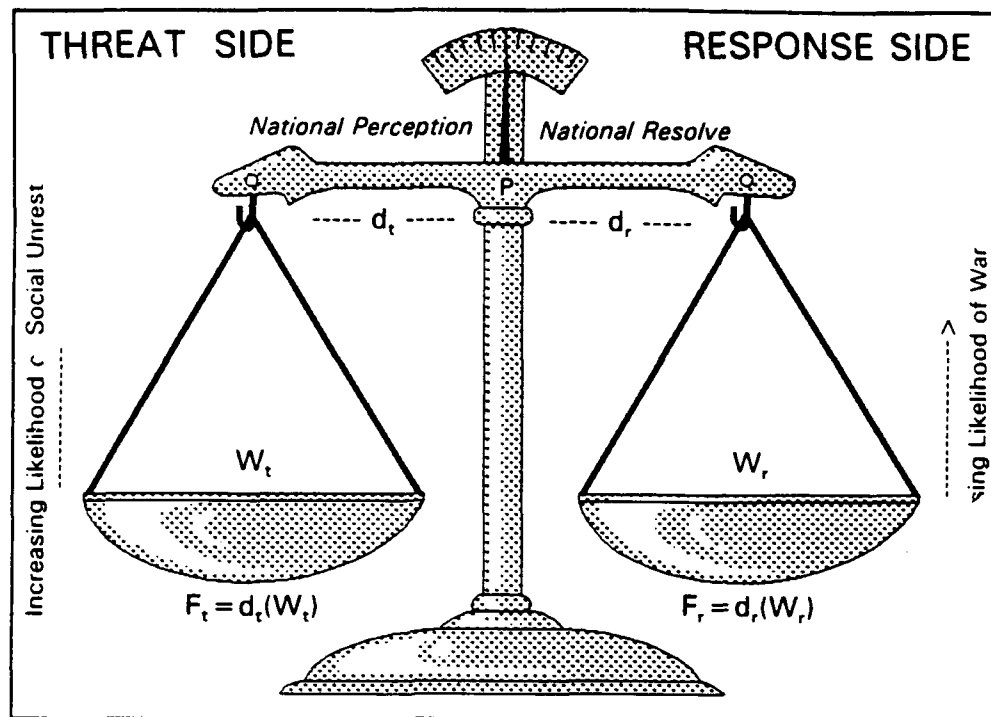


Figure 1

Such a model allows for adjustments in magnitude of both cumulative forces and for scaling of forces on both sides of the pivot-point, (P), by adjusting the displacement, (d), to their attachment. The magnitude of the resultant force, (F), would then be the weight, (W), of the component multiplied by (d). Scaling provides a means of reflecting a change in the resultant force from a constant-sized weight. For example, scaling would reflect the reduced threat posed by an enemy's missile arsenal following a scientific breakthrough in anti-missile technology. A discussion of the model's quantifiable components and their system interaction follows:

1. THREAT (T): Any quantifiable situation, event, or condition that may affect the rational thought process of a nation. *Threat* may be either foreign or domestic and exists as a specific and finite quantity, regardless of its internal or external perception. *Total threat* is the sum of all *threat* components.
2. RESPONSE (R): Any quantifiable action, event, or condition which results from a specific *threat*. *Response* may be either foreign or domestic and exists as a specific and finite quantity, regardless of its internal or external perception. *Total response* is the sum of all *response* components.
3. WEIGHT (W): The empirical magnitude of a specific *threat* or *response*. Although subject to change, *weight* is not affected by perception or its location on the balance.
4. PIVOT-POINT (P): This is the unloaded balance center-point; only one may exist per system.
5. DISPLACEMENT (d): The lateral distance of a given *weight* from the *pivot-point* (P). *Displacement* is always a positive non-zero quantity since no *weight* can be co-located with the *pivot-point*. *Displacement* is subject to changes in magnitude based on national resolve or perception.
6. FORCE (F): The product of *weight* (W) times *displacement* (d). *Force* is specific to a given *threat* or *response* and is always a positive quantity. *Total force* is the sum of all *forces*.

The movement of a threat or response on the balance is dependent on a nation's *perception*, (p), or *resolve* (r). For a given *threat*, its *displacement* from the *pivot-point* is based on national *perception* of the seriousness of that *threat*; the greater the perceived *threat*, the greater the value of (d). For a given *response*, its *displacement* from the *pivot-point* is based on national *resolve* or willingness to commit resources -- the greater the national *resolve*, the greater the value of (d).

Lastly, the swing of the balance away from the horizontal indicates an increase in instability. Movement in a clockwise direction indicates a failure to meet domestic needs and the increased likelihood of social unrest. Movement in an anti-clockwise direction indicates a failure to counter a *threat* and an increased likelihood of war.

The Threat

The threat to peace for the United States is a composite quantity, composed of foreign and domestic issues. Those of greatest weight carry the greatest potential to disrupt peace, merit discussion, and demand specific responses. Eight critical threats to this nation are identified in this section; each will be described separately, and later, paired with a specific national response.

1. Loss of Technological Leadership: Technological leadership is not some desirable end-state or nice-to-have economic

contributor; its loss is, by an order of magnitude, the greatest threat to this nation. No other event could disrupt our social order, damage our economic base, or prove so costly to the nation in terms of recovery. History is replete with examples of how a shift in the technological edge or a scientific breakthrough changed the balance of power and directly influenced the peace process. From the development of rockets by the Chinese to the refinement of weapons of mass destruction by the United States, technological breakthroughs end wars and effectively serve to promote peace.

It is important to establish that concerns about the threat do not take the form of which nation can make a device smaller, make it run faster, or produce it for less money. These concerns fall under an economic mantle which will be discussed later. *At issue here is the impending danger of the United States losing the lead in the conceptualization of a new idea or the formulation of a new process.* Our position could be compared to that of the head mule in the muletrain; we are the only ones with a change of scenery. The issue may be better stated in that we are not trying to "catch up" to an opponent technologically, so we are free to spend our research time in a developmental mode and can view a problem from several different vantage points. Those who chase behind us lack that change of perspective.⁶ More importantly, we guide in fact, and occasionally by default, the technological development of other countries, including those who might wish us harm. No other threat carries the potential devastation to our social order as that of

America falling behind as the world's technological leader and being made to take station astern of some other society. Secondary factors include a perceived decline in the effectiveness of American education and the perception of a weak American work ethic.

2. Failure to Maintain Economic Stability: Despite recent and significant changes in our budget process, the mid-1991 projections of the Office of Management and Budget show fiscal 1991-1993 deficits averaging nearly \$300 billion annually. The national debt, also, has reached record highs; currently, the federal debt held by the public is nearly \$3 trillion.⁷ Singularly significant is the cost increase produced by the growth in entitlements to existing programs rather than in the emergence of new programs, especially Social Security and Medicare growths. In 1989, Social Security expenditures totaled \$230 billion,⁸ and Medicare payments totaled \$102 billion.⁹ Secondary factors include an increase in the negative trade imbalance, the perception of a drop in American productivity, and the perception of a drop in the quality of American manufactured goods.

3. Containment of Escalating Health Care Costs: Total health care spending, represented by national health expenditures, is rising in America at an unprecedented rate. In 1985, total expenses were little more than 10% of the gross national product, or about \$423 billion; in 1990, total expenditures exceeded \$660 billion, and the figures since then indicate an accelerated increase.¹⁰ The health care industry's response has been to raise

health insurance premiums and reduce categories of insurable medical procedures. The net effect of this response on the working-class of America is that a large and rapidly growing segment of the population carries only limited amounts of personal health insurance. So significant is the unaffordability of adequate insurance that an estimated 33 million Americans - 13 percent of our population - carry no insurance whatsoever.¹¹ Tens of millions more carry such limited coverage that they are at risk of financial devastation. Second and third order effects include an increase in costs associated with the development, production, procurement, and maintenance of state-of-the-art, high-tech machines such as computerized tomography, magnetic resonance imagers, and lithotripters. As the machines are used less, the fees associated with each incident of use increase, and the machines quickly become too expensive to use. Additional factors include the longstanding availability of outstanding health care to the general American public and the growing perception in America of health care as a basic human right.

4. Military Reshaping: When the threat is removed, a country will usually reshape (normally downsize) its military forces. The existence of a large military establishment without a discernable threat serves to upset the balance of peace. For example, the dissolution of the Soviet Union, combined with the re-unification of Germany and the defeat of the Iraqi forces in Operation Desert Storm, prompted feelings of a reduced threat to America. When placed against the backdrop of the ongoing American recession,

these events added fuel to the arguments to quickly reduce the size and costs of the military. Planned reductions in our military structure are significant. As reflected in the President's budget proposal, the defense budget is reduced \$50 billion over the next five years, and total forces are reduced by about one-third. The extent and speed of these reductions pose the potential for serious damage to be done to the internal infrastructure of the nation's defense organization. The roles that the U.S. military has played, and can continue to play, in deterring aggression and stabilizing peace both regionally and globally, may be lost. For this reason, the effort to reshape the American military represents a threat to peace.

5. Global Hostilities: The threat of U.S. involvement in an armed conflict remains a distinct possibility. The thought of a loved one participating in combat is an emotional issue and possibly the most important aspect of this threat. America can expect specific changes in the nature of its involvement in global conflict in the foreseeable future. Although it is correct to state that the threat of thermonuclear war with Russia has diminished, the threat has not disappeared. Any number of feasible scenarios could be formulated based upon a possible re-emergence of a Soviet-like Russia. Russian President Yeltsin himself recently underscored this when he commented on his desperate need for foreign assistance, and warned that "...if Russia fails in its reforms, especially of the economy, a dictator will appear."¹²

The demise of the Soviet Union removed a mechanism that has kept several political factions throughout the world in check. Although involvement in a conventional conflict is a possibility, any future U.S. military involvement is most likely to be at the lower end of the conflict spectrum, smaller in scale, but greater in complexity. It is here that developing a military capability to effectively deal with Low Intensity Conflict (LIC) surfaces as a tool for maintaining peace.

Loosely defined as "...political-military confrontation below the level of conventional war...ranging from subversion to the direct use of military force,"¹³ low intensity conflict actually differs from conventional war, more so by differences in type-conflict (or response) than by degree of intensity.¹⁴ American involvement in conflict operations can be expected to assume one or more of the following classic LIC profiles:

A. Peacekeeping Operations: These are military operations carried out to maintain peace between two belligerents following a truce. They may take many forms that include withdrawal and disengagement, cease-fire, prisoner-of-war exchanges, arms control, and demilitarization and demobilization.¹⁵ Actual operations require patrols, observation, mediation and negotiations, and investigation of complaints.

B. Counter-terrorist Operations: Terrorism is defined as "the unlawful use of -- or threatened use of -- force or violence against individuals or property to coerce or intimidate governments or societies, often to achieve political, religious, or ideological

objectives."¹⁶ It is this LIC contingency that has been so highly publicized and which sparks such creative discussion. "Terrorism's most enduring feature remains its capacity to provoke anger, frustration, and fear. Terrorist incidents are sudden, violent and highly publicized."¹⁷ The key to understanding terrorism is that much of the conflict in the world appears to be linked to economic underdevelopment and to old, but unresolved, region-specific struggles to preserve locally cherished ethnic, religious, and independence values. Conflict results from "...the friction caused by efforts to construct a larger society, which inevitably entails the creation of new values and new loyalties."¹⁸ Surprising to many, anti-Western sentiments play a secondary role.

The most dangerous form of terrorism facing America is state-supported terrorism. Although the United States has been spared a great deal of agony resulting from international terrorism, it is not reasonable to assume that we are immune from such acts. "Serious anti-American terrorism...emanates from two distinct philosophies: Marxism-Leninism and Islamic fundamentalism."¹⁹ America represents a threat to these groups because we represent a widely publicized and steadfast commitment to stability, to constructive change, and to the protection of human rights.

C. Insurgency and Counter-insurgency Operations: United States security interests may lie with an insurgent movement or with an incumbent government opposing insurgency. U.S. support for the Nicaraguan "Contras" and opposition to the Peruvian "Shining Path" are two such examples. Insurgency assumes that appropriate

change within the existing system is not likely and that radical change in political control, with extensive use of covert methods, is required. Counter-insurgency typically assumes that change within the existing system is possible and desirable, and focuses on overt action. Insurgency and counter-insurgency are actually two aspects of the same process that differ in execution.²⁰

Insurgencies that succeed usually do so by appealing to the dissatisfaction of a people within a particular political or social situation. They identify a political object, obtain followers and financial support, and may assemble arms and raise an army. They do not have to obtain the support of a majority of the people as long as they receive more effective support than that received by the existing government. To do this, they must replace the government's legitimacy with that of their own and have an ideology which is offered to and accepted by the people as a goal.²¹

D. Counter-narcotics Operations: Former President Reagan identified illegal drug trafficking as "a greater threat to national security, economic well-being and social order than the threat posed by international terrorists or any armed conflict short of war with a major power."²² Some estimates place the amount of money siphoned from the American economy by illegal drug trafficking at \$110 to \$140 billion annually."²³ Counter-narcotics efforts by the U.S. center on cocaine, heroin, marijuana, and dangerous manufactured drugs, with cocaine and heroin receiving primary focus.

One element of the counter-narcotics effort that bears careful study is the connection which often develops between drug traffickers and insurgent groups. This narco-insurgency nexus is a strange alliance, given the divergent ideological perspectives of the two groups: traffickers prefer a weak but stable government, and insurgents seek to create political chaos in the hope of achieving a collapse of the local regime. Understanding their alliance centers on an appreciation of the connection resulting from the insurgent's perception and use of the traffickers as a destabilizing influence and a source of money. Traffickers have little choice but to deal with insurgents because they represent the ideals of the workers upon whom the drug trade depends.

E. Peacetime Contingency Operations: This last area of LIC operations is complex and involves several separate missions, including disaster relief, strikes and raids, rescue and recovery operations, peacemaking, unconventional warfare, and support to U.S. civil authorities.²⁴

Those areas most likely to be future areas of conflict are Korea, Southwest Asia, Peru, the Philippines, Cuba, Yugoslavia, and Ireland. An issue as basic as extreme human rights violations or wanton execution of innocent civilians could spark American military involvement. Re-emergence of a militarily aggressive German Reich, re-establishment of a communist Russian state, or even widespread civil disorder following the collapse of Castro's regime would most likely invoke an American military response. Recent U.S. action in Grenada and Panama demonstrate American

sensitivities to perceived abuses of power -- especially in the western hemisphere -- and underscore America's readiness to use military might when its interests are perceived as being threatened.

6. Illegal Drug Trafficking: Although this issue was addressed in the preceding LIC discussion, it warrants a separate threat category because of its domestic implications. The numbers of Americans affected by the drug trade are staggering: some 25 million Americans have tried cocaine, and an estimated 8 million are addicted to it; marijuana users number 20 million, and heroin claims another half million addicts.²⁵ The voracious appetite of a portion of the American public for illicit drugs makes correction of the problem exceedingly difficult. The attraction of large profits for domestic drug traffickers, particularly in a period of economic recession, contributes to the difficulties of deterring, controlling, and eliminating the threat.

7. The Environment: Several environmental issues confront the nation and must be addressed; virtually all are products of our industrialization efforts -- typically those abuses seen in emergent market societies. The depletion of the atmospheric ozone layer by chlorine monoxide, a chemical by-product of chlorofluorocarbons, was graphically documented recently by the National Aeronautic and Space Administration's Upper Atmosphere Research Satellite.²⁶ Ozone absorbs harmful ultraviolet radiation, a process that is vital to human health. The United Nation's Environmental Program estimates that a 10% depletion in the ozone

layer will produce a 26% increase in the incidence of nonmelanoma skin cancers worldwide. The latest data "...imply that the ozone layer over some regions, including the northernmost parts of the U.S., Canada, Europe, and Russia, could be temporarily depleted in the late winter and early spring [of 1992] by as much as 40%."27 Additionally, the burning of fossil fuels has produced a large amount of residual atmospheric carbon dioxide. Normally, the global flora is capable of converting the carbon dioxide back into oxygen, but the damage to large amounts of forest lands -- particularly in the Amazon River Basin -- have reduced the planet's ability to compensate. The result of a build-up of carbon dioxide is a phenomenon known as global warming, a situation in which the carbon dioxide plays a unique role in trapping heat next to the earth. Such a trend, if unabated, would re-define coast lines as we know them, as the increase in the earth's temperature would melt arctic and antarctic ice. Other critical environmental concerns include the growing problems of nuclear waste disposal and ground water contamination.

8. Moral Decay and Turpitude: The single characteristic preceding the collapse of great societies throughout history is a decline in the moral fabric of a nation. Typically, a society fails to notice gradual moral decay by granting tacit approval to what it views as small or incremental changes. The building block of any successful society is the family unit - father, mother, and children - augmented with grandparents and close relatives. The strength of the family unit in American society is rapidly waning.

For example, there is a moral obligation that children owe parents; that is, that children are to care for their parents when their parents are no longer able to care for themselves. Instead of availing themselves of the tremendous benefits of parental advice when raising their own children, today's American adults shun the thought of personally caring for their parents.²⁸ The demise of the family unit is exacerbated by a growing divorce rate which has eclipsed the median; more than half of today's marriages end in divorce.²⁹ As a growing number of single-parent families is forced to grapple with the tough issues of family life, the children seem to suffer most:

The trend toward quick and easy divorce and the ever increasing divorce rate subject more and more children to physically and emotionally absent parents. The divorce rate has risen 700 percent in this century and continues to rise. There is now one divorce for every 1.8 marriages. Over a million children a year are involved in divorce cases and 13 million children under eighteen have one or both parents missing.³⁰

Mr. Nathan Caplan et al. sees the decline in effectiveness of American education as a function of family break-up. Cited as a basis for this argument is the stunning academic success of Indochinese refugee children, particularly in the realm of science and mathematics.³¹ Despite an often traumatic childhood, a difficult language barrier, and extreme poverty, an overwhelming majority of these children do exceptionally well in some of the least desirable schools in our public education system. The reason that Indochinese refugee children do well is a direct result of ordered and structured support from the basic family unit.³² The

problem with teaching American students today is not, as the author maintains, the fault of teachers, our school buildings, our curriculum, or any other aspect of American education currently trumpeted as defective. Rather, it is the failure of the family unit to serve as the central institution of American life, its values, morals, and outlook.

The Response

Our responses to the new world order are critical to the maintenance of peace. Remembering that the production of peace without subjugation is the job of our government and noting that each threat is best handled with a specific response, we are able to structure our actions to efficiently produce that peace. It can be argued that a specific response of a nation may be to take no action against a given threat. Although that situation periodically exists and the peace balance remains relatively stable, that peace is a tenuous one and relies on the cumulative forces of other, already existing responses. When this happens, it places the nation at increased risk because shifts in apparently unrelated events or situations can have dramatic second and third order effects. For that reason, it is best to assign a specific response to each threat. A secondary benefit from this approach is that *Response time* -- that period necessary to orchestrate a response -- is significantly reduced. The following discussion recommends a specific response to each previously cited threat. Because the political nature of this country is fluid, these

responses are offered empirically, as foci for action, not as oversimplifications of complex problems. To effectively counter the threat, each response must be framed in a politically acceptable format.

1. Loss of Technological Leadership: Now is the time to maximize our research effort. Action must include a significant increase in the amount of funds made available to research institutions and laboratories. Technological advances and major research milestones will be a direct result of this nation's resolve to commit resources to the effort. Our commitment to continue the Strategic Defense Initiative, even in light of the reduced threat of global thermonuclear exchange, is correct, but research in other areas must also be expanded.

Since the United States is not currently engaged in any large-scale military action, it can make a significant impact on the development of our nation by investing much more in our research institutions and laboratories. Advanced electronics, especially computers and systems engineering, should be areas of primary focus. New generation central processing unit design, advanced compiler construction, and object-oriented programming are top-priority targets. Object-oriented programming, in particular, promises a rapid payback in productivity.³³ It offers the first real hope of machine independent code and provides a way to link the existing maze of incompatible computers and software. Although the Defense Department has specified twenty critical technologies,³⁴ the list does not meet our immediate needs.

Important areas also must include the following: biology, especially genetic engineering and mapping of the human genome; physics, especially in plasma physics and the construction of directed energy systems; and chemistry, especially biochemistry. All of these endeavors will require intelligent, well-educated, and highly motivated research and application engineers -- products of the quality educational system we construct.

2. Failure to Maintain Economic Stability: The current economic recession is essentially a result of rapid growth in entitlements of existent programs past the point of revenue support. A freeze in entitlement growth is the first step to recovery. Next, investment incentives, particularly in the areas of research and development, and capital growth, along with reduced exposure for extremely high-risk ventures, must be offered if the private sector is to contribute significantly to our economic recovery effort. The key lies in reducing expenditures while boosting productivity.

3. Containment of Escalating Health Care Costs: The solution to the health care issue does not lie in a socialized health care system. Our society would surely incur an overwhelming financial liability similar to other countries with socialized health care. The reason that any socialized system is wrong is that a nation's appetite for health care is insatiable when the perception exists that "someone else is paying the bill." The problem in America is that medical health care insurance has become too expensive and our solution must address that issue. What our nation seeks is

adequate health care for its people. The best proposal lies in a participatory program consisting of prepaid plans, contracting with providers at a substantially reduced rate or capitation basis. It would require acceptance by the patient of the loss of some freedom of choice of some physicians and hospitals and the loss of some elective procedures which might be denied by a reviewing board of such organizations. Reform would consist of freezing growth of entitlements in existent federal programs and modifying state programs to focus on preventive medicine.

4. Military Reshaping: The downsizing of the United States military is the correct course of action. Although the issue of elimination of any members of an all-volunteer force carries substantial social overtones, the fact remains that the maintenance of a large military, when the perception of a need for a large military no longer exists, has an unacceptable opportunity cost. Proposed cuts, however, must not proceed beyond proposed end-strengths, nor must they be allowed to proceed at an accelerated pace. The danger of either modification lies in the virtual certainty of inflicting serious damage to the organizational infrastructure of the military components themselves.

5. Global Hostilities: A downsized military force must be trained to function in the joint low intensity conflict environments previously discussed. Our best efforts must be made in the diplomatic arena to preclude conflict. Innovative use of our military resources to foster goodwill and strengthen military ties with foreign military organizations is highly desirable.

Beyond that, we must prepare for a smaller and more mobile military force, armed with more timely and better processed information.

6. Illegal Drug Trafficking: The myriad of agencies involved in counternarcotics efforts results in wastes of energy and resources and in duplication of effort. The solution to America's drug problems lies in aggressive action in three central areas: reduce demand by educating America's youth on the dangers of illicit drug use; introduce economic measures and incentives in target countries to make illegal drug crop production and trafficking financially unattractive; and expand the roles for the U.S. military in drug flow interdiction. Additionally, the administrative and legal centralization of all anti-drug efforts is necessary to develop and implement a coherent strategy.

7. The Environment: The global problems we face are those produced by rapid industrialization, depletion of national resources, and disregard for the second and third order effects of our actions. The solution lies in a correction of the root problem; we must find an affordable alternative to fossil fuels as a primary energy source. At the recent Tokyo Motor Show, Mazda introduced a unique automobile which uses a hydrogen-fueled rotary engine.³⁵ This car burns hydrogen, stored in a relatively safe metal-hydride form, and it exhausts water and oxygen. As incredible as it might seem, separated sea water could provide all the fuel this world might need for its internal combustion engines. Recent advances in electrical storage batteries and thermal transfer composites make solar augmentation financially affordable

and economically feasible. A primary focus on *awareness*, coupled with the will to act in a positive manner to correct environmental problem root causes, affords us the best option for the future.

8. Moral Decay and Turpitude: Again, the correction of any problem must focus on the root cause, not some tangentially related effect. We must re-focus on the family because its traditions and ties form a basis for growth. Because divorce physically separates families and thereby destroys the foundation of our society, it is the problem which must be corrected. We must focus our efforts on reducing the escalating divorce rate previously addressed by educating our young people about marriage responsibilities and obligations, and then by setting a proper example for them to follow. All that flows from that works to our advantage.

Model Quantification

Aside from its obvious value to discussions, the model described at the beginning of this study has value as a quantification tool. By assigning a weight to each component and determining a displacement location, a force value can be determined for each component. A determination of equilibrium would result from a summation of the forces on each side of the equation. Further, applying numeric value to the system components allows the model to demonstrate the current state of a nation, based on known, empirical data. The actual model input involves a conversion of data to a common unit; in this case, the maximum quantifiable unit is 1. Information such as the size of an army,

the defense budget expenditures compared to Gross National Product, the rise in serious crime, or the current level of external debt can be readily attained; these numbers constitute system component weight. Quantification of national resolve and national perception are no more difficult than component weight determination. Again, a system based on unity allows the input of values ranging from near-zero, (no weight may be co-located with the pivot-point (P)), to 1. Initial determination would involve a high (0.9), medium (0.6), or low (0.3) decision, with degrees of displacement still available; i.e., a value of 0.7. A quantified model is demonstrated in Appendix A to this study. Lastly, it is desirable to incorporate these values in a graphical representation scheme to reduce evaluation time and increase evaluation efficiency. This process has been available for some time in quantification models such as "Chernoff faces".³⁶ Examples of this unique representation system are included in Appendix B. Although a complete cross-comparison of data inputs and outputs would be an interesting endeavor, it is beyond the scope of this study.

At this point, the model becomes a tool for predicting a nation's best course of action. If a national model is constructed and adjusted often, small changes in apparently unrelated components will surface as potential problems for a given society. Applied to the world, each model becomes a prediction tool for external concern. Linked to a global system, the model becomes a decision support system for foreign policy.

CONCLUSION

In summary, the task before us could not be more difficult. We must successfully deal with a number of serious and politically sensitive challenges to our survival as a nation at a time when many Americans question the very existence of a threat. With a renewed emphasis on both domestic and international regional sensitivities, we must use every analytical tool available to us to best ensure a lasting peace. The model presented in this study allows for quantification of seemingly intangible data and offers a valuable tool for decision making. The Soviet Union no longer exists, Germany is reunited, and the Cold War is over, but the job of maintaining peace is far from over. As we reshape our military, redirect our domestic focus, and redefine our international interests, we must make sure that our actions do not upset the balance of peace. Properly constructed and routinely adjusted, this tool can assist in that effort.

Endnotes

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3. Ibid., 1019.
4. Ibid., 1011.
5. Ibid., 1010.
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14. U.S. Departments of the Army and the Air Force, Field Manual 100-20/Air Force Pamphlet 3-20, Military Operations in Low Intensity Conflict (Washington, D.C.: 5 December 1990), iv, (hereafter referred to as "FM 100-20").
15. Ibid., 4-1.
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21. Ibid., 2-2.
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26. Michael D. Lemonick, "The Ozone Vanishes," Time (17 February 1992): 60.
27. Ibid.
28. Linda L. Creighton, "Grandparents: The Silent Saviors," U.S. News and World Report (16 December 1991): 80.
29. Armand M. Nicholi, Jr., Family Building (Ventura, Ca.: G/L Publications, 1985), as cited in Nancy Leigh DeMoss, ed., The Rebirth of America (United States of America: Arthur S. DeMoss Foundation, 1986), 93.
30. Ibid.
31. Nathan Caplan, Marcella H. Choy, and John K. Whitmire, "Indochinese Refugee Families and Academic Achievement," Scientific American (February 1992): 36.
32. Ibid.
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36. Peter C. C. Wang, ed., Graphical Representation of Multivariate Data (New York: Atlantic Press, 1978), 125-131.

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APPENDIX A

Quantification Example

Model quantification involves the identification of threat and response variables on both sides of the equation, a determination of weight for each, and an assignment of the displacement for each from the pivot-point. As mentioned before, the perception of each threat variable and the nation's resolve in its response to each threat directly influence the force each exerts on the model.

Threat and response identification in this example will reflect those eight issues cited in the project paper. Each follows with its associated displacement value.

1. Loss of Technological Leadership (T_1): Weight = 1.0.

The maximum value is assigned based on the cost to regain the lead, should it be lost, and rapid advances in technology in other countries. $d_{T_1} = 0.3$. The perception of this loss as a threat is not fully developed; maintaining technological leadership is still viewed as just another desirable state. (R_1): Weight = 0.6. A medium value is assigned because of a moderate funding provided and lack of significant private investment incentives. $d_{R_1} = 0.6$. Closely tied to the perception of the threat is national resolve to commit resources towards maintenance of the technological leadership. For example, the financial support given the Strategic Defense Initiative is interesting, given the nation's general

perception of the lack of a specific threat. Simply put, people think it is a "good idea," but do not relate it to a specific threat. Nonetheless, it has quantifiable support, as indicated by the medium value.

2. Failure to Maintain Economic Stability (T_2): Weight = 0.9.

It is the consistent trend toward expansion of existing programs, past the point of revenue, that presents the highest threat. $d_{T_2} = 0.7$. The nation is acutely aware of the financial problems facing it and recognizes it as a threat. (R_2): Weight = 0.3. The failure to enact effective measures to control spending results in a low weight assignment. $d_{R_2} = 0.6$. There are many external factors affecting the actions of the nation in an election year. The resolve of the nation to act on the economic problem is firm and will express itself as the election process proceeds.

3. Containment of Escalating Health Care Costs (T_3): Weight = 0.6. A medium value is assigned because of the escalating costs associated with health care. Although a steady increase does not normally constitute assignment of a medium threat, it is the increase in cost of health care insurance which warrants a medium weight assignment. $d_{T_3} = 0.8$. Although emotion plays a large role in such a high displacement value, it expresses itself in the way people think, act, and vote; many Americans are scared that they will need medical but be unable to afford it. (R_3): Weight = 0.3. Excepting isolated

incidents of progressive reform, the response of the nation has been perfunctory and rhetorical. Because it is a complex and emotional issue, many Americans have diminished expectations but feel strongly that federal action must occur soon. $d_{R3} = 0.6$. A medium value is assigned to reflect that concern.

4. Military Reshaping (T_4): Weight = 0.6. A medium value reflects the restructuring effort, which may change the nature of the military organizations. $d_{T4} = 0.2$. Largely, the public does not view the reshaping effort as a threat to peace. Their perception is that many servicemen and women, or service-related individuals will be without a job. (R_4): Weight = 0.6 The significant action outlined by President Bush warrants a medium weight assignment. $d_{R4} = 0.7$. The reduction of military forces at this time has wide-spread support; differences exist in execution.

5. Global Hostilities (T_5): Weight = 0.3. A low value is assigned based on the likelihood of conflict which will involve this nation. $d_{T5} = 0.2$. Americans are confident that the U.S. military can defend America's interests anywhere in the world, with little real threat to the nation. (R_5): Weight = 0.6. Although reshaping is planned, it has not happened. Political opposition to various aspects of the restructuring effort is growing as large numbers of people -- reservists, contractors, and suppliers -- are affected.

Changes based on politics threaten to de-stabilize the balanced force now programmed. Additionally, the ability of the U.S. to respond to a threat militarily still exceeds any definable threat. $d_{R5} = 0.6$. Support for legitimate military action is consistent.

6. Illegal Drug Trafficking (T_6): Weight = 0.9. The devastation produced from illegal drug usage warrants assignment of a high threat value. $d_{T6} = 0.7$. There is universal acceptance of the threat posed by illicit drug use. (R_6): Weight = 0.3. Although there has been considerable activity in the anti-drug arena, the net response has been unproductive, given the rise in illicit drug usage. $d_{R6} = 0.3$. The willingness to act on an individual level is high, but the willingness of the nation to enact comprehensive measures to produce significant drug enforcement reform is not apparent.

7. The Environment (T_7): Weight = 0.8. The seriousness of the environmental damage is no longer a tangential issue and must not be underestimated. $d_{T7} = 0.6$. Although many Americans intellectually understand the problems facing our environment, the majority has no emotional appreciation for the magnitude of specific problems or how they personally may be affected. (R_7): Weight = 0.3. Efforts to date have been focused on repairing results when primary emphasis should be made on prevention. $d_{R7} = 0.3$. The lack of personal appreciation for the threat

is reflected in the lack of support for environmental protection legislation prior to actual environmental damage.

8. Moral Decay and Turpitude (T_8): Weight = 0.9. The damage to our social infrastructure is serious and warrants a high weight assignment. $d_{T8} = 0.2$. The perception of moral decay as a threat to peace in this nation is virtually unrecognized and is described by many as just a desirable end state. (R_8): Weight = 0.1. The lack of any recognizable response results in the lowest possible assignment. $d_{R8} = 0.3$. Albeit low, support for proactive legislation is available.

Quantification now involves substitution of the given values in the formulas previously referenced, as follow:

Given that: $F_{T1} = d_{T1}(W_{T1})$, then

$$\begin{aligned} F_{T1} &= 0.3(1.0) = 0.30 \\ F_{T2} &= 0.7(0.9) = 0.63 \\ F_{T3} &= 0.6(0.8) = 0.48 \\ F_{T4} &= 0.2(0.6) = 0.12 \\ F_{T5} &= 0.2(0.3) = 0.06 \\ F_{T6} &= 0.7(0.9) = 0.63 \\ F_{T7} &= 0.6(0.8) = 0.48 \\ F_{T8} &= 0.2(0.9) = 0.18 \end{aligned}$$

Similarly, $F_{R1} = d_{R1}(W_{R1})$, then

$$\begin{aligned} F_{R1} &= 0.6(0.6) = 0.36 \\ F_{R2} &= 0.6(0.3) = 0.18 \\ F_{R3} &= 0.6(0.3) = 0.18 \\ F_{R4} &= 0.7(0.6) = 0.42 \\ F_{R5} &= 0.6(0.6) = 0.36 \\ F_{R6} &= 0.3(0.3) = 0.09 \\ F_{R7} &= 0.3(0.3) = 0.09 \\ F_{R8} &= 0.3(0.1) = 0.03 \end{aligned}$$

$$\text{Total Force}_{\text{Threat}} = F_{T1} + F_{T2} + \dots + F_{T8} = 2.88$$

$$\text{Total Force}_{\text{Response}} = F_{R1} + F_{R2} + \dots + F_{R8} = 1.71$$

The greatest threat weights are T_1 (1.0), and T_2 , T_6 and T_8 (0.9 each); they represent (in shortened form), Technological Leadership, Economic Stability, Drugs, and Moral Decay. With the exception of Technological Leadership, these items reflect those variables which had the greatest impact on the model. The low value of perception assigned to Technological Leadership as a threat caused its total force to be ranked next to last, just above that posed by Moral Decay.

The greatest response weight are R_1 , R_4 , and R_5 (0.6 each); they represent (in shortened form), Technological Leadership, Military Reshaping, and Global Hostilities. These responses also had the greatest net effect on the model.

The difference between the total threat and the total response variable is small -- 1.17 -- and is less than either of the two major variable categories (*threat* or *response*). The movement of the balance here is in an anti-clockwise direction, given the summation totals. Such movement indicates an increased likelihood of war, and although this produces a small moment about the pivot-point, it is just the case experienced by countries which allow domestic conditions to steadily decline. Note that the major net influences on the threat side of the scale are from domestic issues. The major concern from the foregoing is that our primary responses (those of greatest weight) are not directed at our most serious threats (also those of greatest weight). As discussed earlier in the paper, peace can exist in such an environment but it

is a tenuous and fragile peace. If the model is accurate, we would do well to focus our responses as a nation on the threats of greatest weight -- Technological Leadership, Economic Stability, Illicit Drugs, and Moral Decay.

Lastly, the numeric results of the model can be used in a graphical representation scheme to construct an image of processed data, that can be of considerable value to a decision maker. Any of the five schemes described in Appendix B are valid, but the Chernoff Faces scheme may be the most interesting.

APPENDIX B

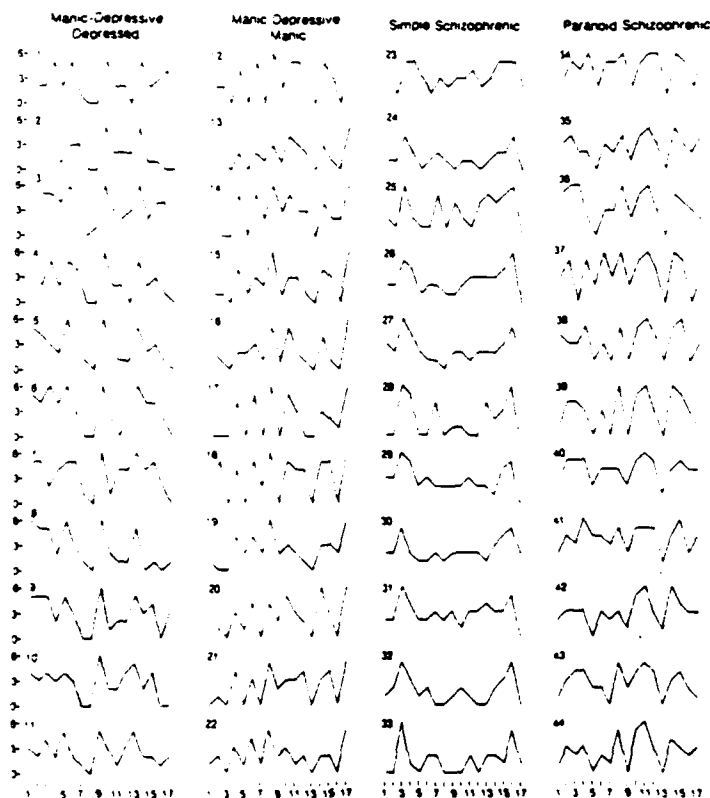
Graphic Representation Schemes

It is possible to represent data in many different ways; charts and graphs are two such devices, or *schemes*. Regardless of the scheme used, the purpose is to increase understanding and to represent the true state of a system, based on all available information. Today, we typically make available to leaders and decision makers a tremendous amount of information. Often this information is unprocessed; if it is processed, often an important data element is omitted as unimportant or unrelated information.

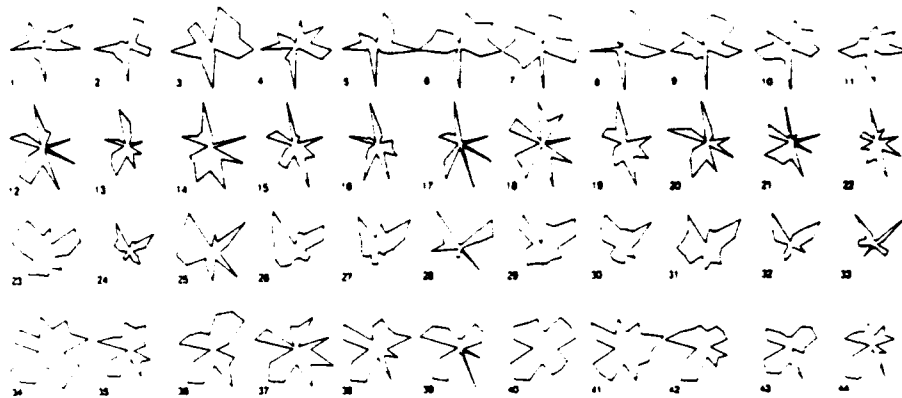
Schemes which display data without information loss are common but often cumbersome. Schemes which process data to aid understanding, usually do so with an associated loss of data. The ideal representation scheme should display processed data in a manner that eases understanding but does so with no loss of information. This is especially true when time-sensitive information must be processed and delivered to a decision maker under pressure. In this environment, pictures -- graphical representations -- are of particular value.

The following examples are taken from Peter C. C. Wang's previously referenced book, Graphical Representation of Multivariate Data. Included are examples of: a Linear Profile; a Circular (Polar) Profile; a Linear Fourier Representation; a Polar Fourier Representation; and, a Chernoff's Faces Representation. Each example displays identical information; in this case,

seventeen psychopathological symptoms in 44 archetypal psychiatric patients. The examples demonstrate the applicability of the method to a wide range of data sources. Although patients were used here, platoons could just have easily been substituted. The specific point is made of the Chernoff face presentation clarity and the ease of information assimilation associated with this particular scheme. Lastly, a representation of the Chernoff face and its variables is included.

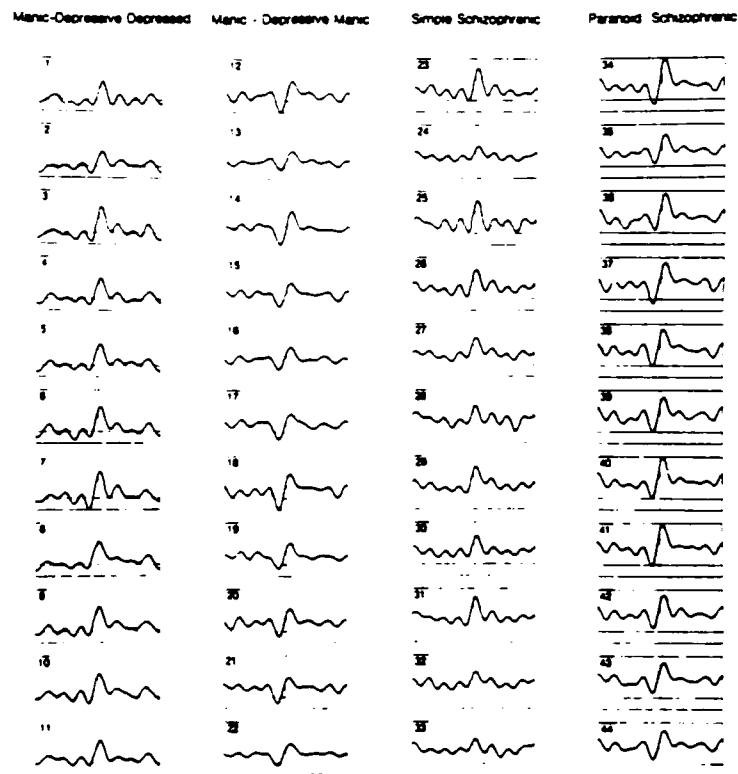


Example 1
Linear Profile

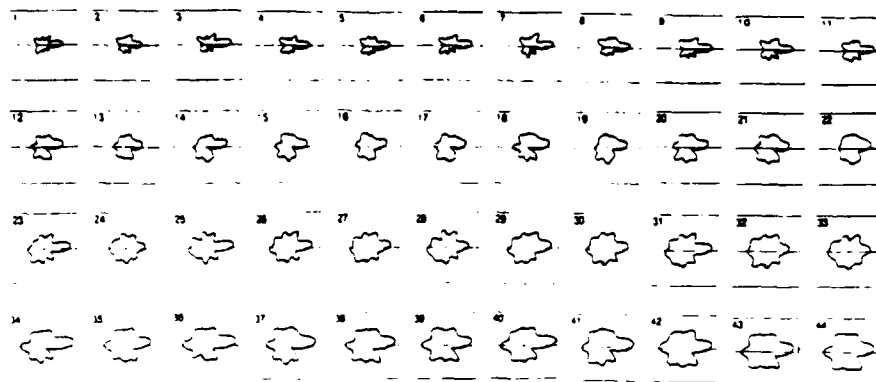


1-11 Manic-Depressive Depressed
 12-22 Manic-Depressive Manic
 23-33 Simple Schizophrenic
 34-44 Paranoid Schizophrenic

Example 2 Circular (Polar) Profile

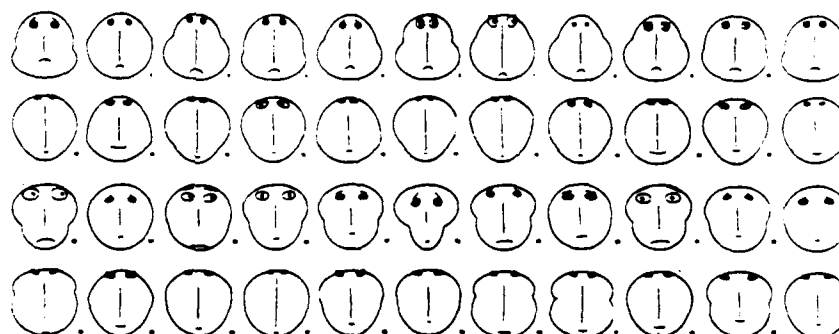


Example 3 Linear Fourier Representation



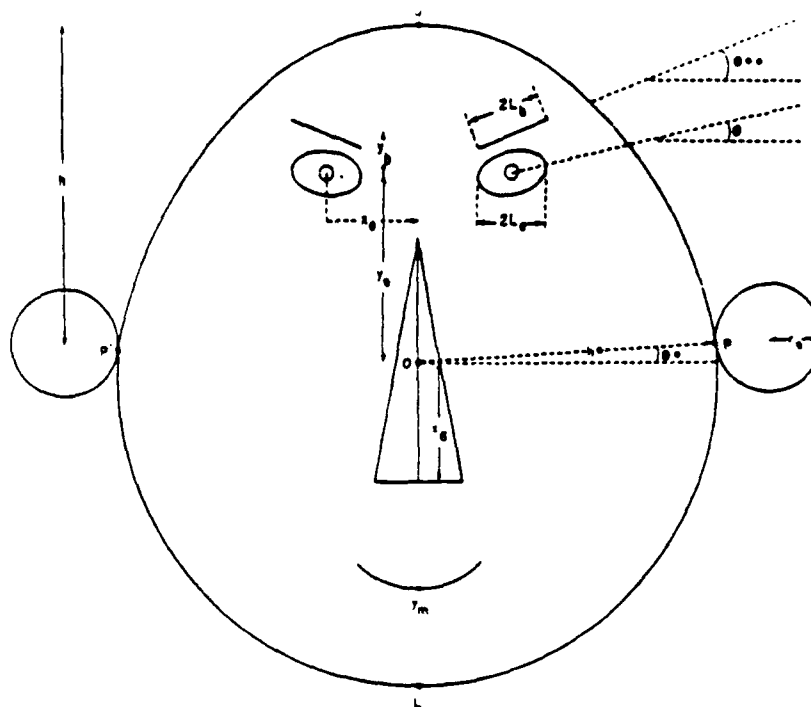
1-11 Manic-Depressive Depressed
 12-22 Manic - Depressive Manic
 23-33 Simple Schizophrenic
 34-44 Paranoid Schizophrenic

Example 4 Polar Fourier Representation



1-11 Manic-Depressive Depressed
 12-22 Manic-Depressive Manic
 23-33 Simple Schizophrenic
 34-44 Paranoid Schizophrenic

Example 5 Chernoff Faces Representation



Variable	Range	Description	
X_1	(.2, .7)	Distance from origin O to P	h^*
X_2	(.35, .65)	Angle between OP and X-axis	θ^*
X_3	(.5, 1.0)	Half height of face	h
X_4	(.5, 1.0)	Eccentricity of upper ellipse	
X_5	(.5, 1.0)	Eccentricity of lower ellipse	
X_6	(.15, .4)	Length of nose	
X_7	(.2, .8)	Position of center of mouth	Y_m
X_8	(-4, 4)	Curvature of mouth	
X_9	(.3, 1)	Length of mouth	am
X_{10}	(0, .3)	Height of centers of eyes	Y_e
X_{11}	(.3, .8)	Separation of center of eyes	x_e
X_{12}	(.2, .6)	Slant of eyes	θ
X_{13}	(.4, .8)	Eccentricity of eyes	
X_{14}	(.2, 1.0)	Half-length of eyes	L_e
X_{15}	(.2, .8)	Position of pupils	
X_{16}	(.6, 1.0)	Height of eyebrow center relative to eye	Y_b
X_{17}	(0, 1.0)	Angle of eyebrow	θ^{**}
X_{18}	(.3, 1.0)	Length of eyebrow	L_b
X_{20}	(.1, 1.0)	Ear diameter	Y_e
X_{21}	(.1, .2)	Nose width	

Example 6
Chernoff face program variables